

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (currently amended): A transport layer relay method performed by a transport layer relay device, the method for comprising:

terminating, at the transport layer relay device, each of a plurality of first transport layer connections connection between a first source terminal and a first destination terminal at a first transmission rate in the transport layer and a second transport layer connection between a second source terminal and a second destination terminal at a second transmission rate in the transport layer; and

relaying data flow on each of said first transport layer connections connection to said first destination terminal as a first relay connection and data flow of said second transport layer connection to said second destination terminal as a second relay connection to respectively separate said first and second transport layer connections;

determining a wherein the total transmission rate of relay said first and second relay connections based on the first and second transmission rates that are being used for relay is determined, and said total transmission rate is divided for allotment; and

allocating the total transmission rate as the transmission rates among each of said first and second relay connections that are being used in relay,

wherein the first source terminal, the second source terminal, the first destination terminal, and the second destination terminal are different from each other.

2. (currently amended): ~~A-The transport layer relay method~~ according to claim 1, wherein said total transmission rate is determined in accordance with the number of transport layer connections that are being relayed and the congestion conditions of ~~the a~~ network through which the relay connections pass.

3. (currently amended): ~~A-The transport layer relay method~~ according to claim 1, wherein said total transmission rate is determined in accordance with the number of transport layer connections that are being relayed and the congestion conditions of ~~the a~~ network through which the relay connections pass such that desired effective transmission rates are attained for ~~all each~~ each relay connections ~~connection that are being used in relay.~~

4. (currently amended): ~~A-The transport layer relay method~~ according to claim 1, wherein said total transmission rate is determined in accordance with the number of transport layer connections that are being relayed and the congestion conditions of ~~the a~~ network through which the relay connections pass such that effective transmission rates ~~are attained for of all each~~ relay connections ~~connection that are being used for relay can be attained while, and~~

~~wherein~~ ~~confering~~ ~~priorities to~~ ~~transmission rates for~~ ~~traffic,~~ ~~other than~~ ~~the~~ ~~relay~~ ~~connections,~~ ~~that~~ ~~share~~ ~~shares a~~ ~~bottlenecks~~ ~~bottleneck~~ ~~with~~ ~~the~~ ~~relay~~ ~~connections~~ ~~are~~ ~~allocated~~ ~~differently than~~ ~~transmission rates~~ ~~allocated to~~ ~~the~~ ~~relay~~ ~~connections.~~

5. (currently amended): ~~A~~ ~~The~~ ~~transport layer~~ ~~relay~~ ~~method~~ according to claim 1, wherein said total transmission rate is ~~divided and allotted~~ allocated to transmission rates of each of said ~~first and second~~ relay connections depending on application information in said data flow ~~on~~ of each of said ~~first and second~~ relay connections.

6. (currently amended): ~~A~~ ~~The~~ ~~transport layer~~ ~~relay~~ ~~method~~ according to claim 1, further comprising ~~wherein the results of~~ ~~estimating,~~ by means of measurement packets, the congestion conditions of a network through which the first and second relay connections pass, wherein said congestion conditions ~~are also~~ used to determine said total transmission rate.

7. (currently amended): ~~A~~ ~~The~~ ~~transport layer~~ ~~relay~~ ~~method~~ according to claim 1, ~~wherein the results of~~ further comprising ~~estimating,~~ by means of relay packets, the congestion conditions of a network through which the first and second relay connections pass, wherein said congestion conditions ~~are also~~ used to determine said total transmission rate.

8. (currently amended): A transport layer relay device, wherein said transport layer relay device includes comprising:

a plurality of first terminal-side connection termination units-unit for terminating that terminates each of a plurality of first transport layer connections-connection with-between a first source terminals-terminal and a first destination terminal in a transport layer;

a second terminal-side connection termination unit that terminates a second transport layer connection between a second source terminal and a second destination terminal in a transport layer;-and

a plurality of first interdevice connection termination units-unit for that terminating terminates each of a plurality of first transport layer connections-connection between-with a first transport layer relay devices-device for that relaying-relays transport layer data between each of said first terminal-side connection termination units-unit and each of said first interdevice connection termination units-unit;

a second interdevice connection termination unit that terminates a second transport layer connection between a second transport layer device that relays transport layer data between said second terminal-side connection termination unit and said second interdevice connection termination unit; and

a transmission rate control unit that controls transmission rates of wherein: said first and second interdevice connection termination units-transmit in accordance with a transmission rate that is reported from a transmission rate control unit;-and;

wherein the transmission rate control unit determines the a total transmission rate of all interdevice connection termination units that are used in relay, divides allocates said total transmission rate among said first and second interdevice connection termination units, and reports the a respective transmission rates rate that have has been divided and allotted allocated to each said first and second interdevice connection termination unit that is being used in relay units, said first interdevice connection termination unit relaying said first transport layer connection to said first destination terminal as a first relay connection based on said allocated total transmission rate and said second interdevice connection termination unit relaying said second transport layer connection to said second destination terminal as a second relay connection based on said allocated total transmission rate, and

wherein the first source terminal, the second source terminal, the first destination terminal, and the second destination terminal are different from each other.

9. (currently amended): ~~A-The transport layer relay~~ device according to claim 8, wherein said transmission rate control unit determines said total transmission rate in accordance with the number of transport layer connections that are being relayed and the connection-specific congestion information ~~that is reported~~ from each interdevice connection termination unit.

10. (currently amended): ~~A-The transport layer relay~~ device according to claim 8, wherein said transmission rate control unit determines said total transmission rate in accordance with the number of transport layer connections that are being relayed and connection-specific

congestion information ~~that is reported from each interdevice connection termination unit such that the effective transmission rates of all for each relay connections connection that are being used in relay~~ attain a desired transmission rate.

11. (currently amended): ~~A~~ The transport layer relay device according to claim 8, wherein said transmission rate control unit determines said total transmission rate in accordance with the number of transport layer connections that are being relayed and connection-specific congestion information ~~that is reported from each interdevice connection termination unit such that said effective transmission rates of all for each relay connections connection that are being used in relay~~ are attained ~~while, and~~

~~wherein conferring priorities to transmission rates for traffic, other than the relay connections, that share~~ shares a bottleneck's bottleneck with the relay connections are allocated differently than transmission rates allocated to the relay connections.

12. (currently amended): ~~A~~ The transport layer relay device according to claim 8, further comprising:

an application information analysis unit ~~for that~~, when relaying transport layer data between each of said first and second terminal-side connection termination units and each of said first and second interdevice connection termination ~~unit~~ units, analyzing-analyzes application information in said transport layer data ~~[[;]]~~.

wherein said transmission rate control unit ~~divides and allocates~~ said total transmission rate among the transmission rates of each of said first and second relay connections based on the application information ~~from analyzed by~~ said application information analysis unit.

13. (currently amended): ~~A~~ The transport layer relay device according to claim 8, further comprising:

a network condition estimation unit ~~for that~~, based on measurement packets, inferring estimates congestion conditions of the a network through which said first and second relay connections pass[[{:}]],

wherein said transmission rate control unit ~~also uses the results inferred~~ congestion conditions estimated by said network condition estimation unit to determine said total transmission rate.

14. (currently amended): ~~Any one of The transport layer relay devices~~ device according to claim 8, further comprising:

an inline measurement unit ~~for that~~, by means of packets that are relayed, inferring estimates congestion conditions of the a network through which said first and second relay connections pass[[{:}]],

wherein said transmission rate control unit ~~also uses the results inferred~~ estimated by said inline measurement unit to determine said total transmission rate.

15. (currently amended): A transport layer relay method performed by a transport layer relay device, the method for comprising:

terminating, at the transport relay device, each of a plurality of transport layer connections in respective a first transport layers layer and each of a plurality of transport layer connections in a second transport layer; and then

grouping the plurality of connections in the first transport layer data flows on each of said transport layer connections into one a first relay connection transport layer connection in the first transport layer for relaying and the plurality of connections in the second transport layer into a second relay connection in the second transport layer;

determining a total transmission rate of the first and second relay connections;

allocating the total transmission rate among each of said first and second relay connections, wherein: the total transmission rate of the relay connections is determined, and

wherein the data flows from each of plurality of connections in said first transport layer connections are grouped as the to a first relay connection in accordance with divided a transmission rates rate allocated from the total transmission rate and the plurality of connections in the second transport layer are grouped as the second relay connection in accordance with a transmission rate allocated from the total transmission rate of said total transmission rate.

16. (currently amended): A-~~The transport layer relay~~-method according to claim 15, wherein said total transmission rate is determined in accordance with the number of transport layer connections that are being relayed and congestion conditions of ~~the a~~ network through which the relay connections pass.

17. (currently amended): A-~~The transport layer relay~~-method according to claim 15, wherein said total transmission rate is determined in accordance with the number of transport layer connections that are being relayed and congestion conditions of ~~the a~~ network through which the relay connections pass such that desired effective transmission rates are attained for ~~all~~ each ~~relay connections-connection~~ connection that are being used in relay.

18. (currently amended): A-~~The transport layer relay~~-method according to claim 15, wherein said total transmission rate is determined in accordance with the number of transport layer connections that are being relayed and congestion conditions of ~~the a~~ network through which the relay connections pass such that ~~an-effective~~ transmission ~~rate-rates are attained for of~~ all ~~each~~ relay connections-connection that are being used in relay can be attained while, and wherein conferring priorities to transmission rates for traffic, other than the relay connections, that ~~shares-shares a bottleneck-bottleneck~~ with the relay connections are allocated differently than transmission rates allocated to the relay connections.

19. (currently amended): A ~~The transport layer relay~~ method according to claim 15, wherein data flows from each of said plurality of connections in the first transport layer and the plurality of connections in the second transport layer are grouped to a relay connection in accordance with transmission rates for which said total transmission rate has been divided allocated based depending on application information in said plurality of connections in the first transport layer and the plurality of connections in the second transport layer data flows.

20. (currently amended): A ~~The transport layer relay~~ method according to claim 15 further comprising, wherein the results of estimating, by means of measurement packets, congestion conditions of the network through which the first and second relay connections pass, wherein said congestion conditions are also used to determine said total transmission rate.

21. (currently amended): A ~~The transport layer relay~~ method according to claim 15, ~~wherein results of further comprising~~ estimating, by means of relay packets, congestion conditions of the ~~a~~ network through which the first and second relay connections pass, wherein said congestion conditions are also used to determine said total transmission rate.

22. (currently amended): A transport layer relay device ~~having~~ comprising:

a plurality of terminal-side connection termination units ~~for terminating that terminate~~
transport layer connections ~~with between a plurality of source terminals and a plurality of~~
~~destination terminals~~ in the transport layer;

~~one an~~ interdevice connection termination unit ~~for terminating that terminates a plurality~~
of transport layer ~~connection connections~~ ~~between with a plurality of~~ transport layer relay
devices ~~that relay transport layer data between said plurality of terminal-side connection~~
~~termination units and said interdevice connection termination unit~~; and

an MUX-DEMUX unit ~~for grouping that groups~~ transport layer data from each of said
plurality of terminal-side connection termination units ~~as a plurality of relay connections and~~
~~transferring transfers the plurality of relay connections to said interdevice connection termination~~
unit; ~~and~~

~~a transmission rate control unit that determines a total transmission rate of the plurality of~~
~~relay connections and allocates each transmission rate of the plurality of relay connections based~~
~~on the total transmission rate,~~

wherein[[;]] said interdevice connection termination unit transmits ~~said plurality of relay~~
~~connections to said plurality of destination terminals in accordance with a the total transmission~~
~~rate that is reported from a transmission rate control unit,~~

~~wherein said~~ MUX-DEMUX unit groups data from ~~the plurality of terminal-side~~
connection termination units in accordance ~~with the distribution of transmission rates that is~~
~~reported from allocated by the transmission rate control unit[[;]], and~~

wherein the transmission rate control unit determines and reports the total transmission rate of said interdevice connection termination unit and reports the distribution-allocation of rates among the plurality of relay connections obtained by dividing said total transmission rate to said MUX-DEMUX unit.

23. (currently amended): ~~A-The transport layer relay~~ device according to claim 22, wherein said transmission rate control unit determines said total transmission rate in accordance with the number of transport layer connections that are being relayed and congestion information of connections ~~that are~~ reported from the interdevice connection termination unit.

24. (currently amended): ~~A-The transport layer relay~~ device according to claim 22, wherein said transmission rate control unit determines said total transmission rate in accordance with the number of transport layer connections that are being relayed and congestion information of connections ~~that is~~ reported from the interdevice connection termination unit such that the effective transmission rate-rates of for each of the plurality of relay connections ~~attains-attain~~ a desired rate.

25. (currently amended): ~~A-The transport layer relay~~ device according to claim 22, wherein said transmission rate control unit determines said total transmission rate in accordance with the number of transport layer connections that are being relayed and congestion information

of connections that ~~is reported from each interdevice connection termination unit such that the effective rate-rates of for each of the plurality of relay connections is are attained while, and~~
~~wherein conferring priorities transmission rates for to-traffic, other than relay connections, that shares-share a bottleneck-bottleneck with the plurality of relay connections are allocated differently than transmission rates allocated to the relay connections.~~

26. (currently amended): ~~A-The transport layer relay device according to claim 22,~~
further comprising:

an application information analysis unit ~~for analyzing~~that analyzes application information in transport layer data when transport layer data are transferred between each of said terminal-side connection termination ~~unit-units~~ and said MUX-DEMUX unit[[i]].

wherein said transmission rate control unit ~~divides-allocates~~ said total transmission rate among the transmission rates of each of the plurality of relay connections and determines the distribution that is reported-reports the allocated transmission rates to said MUX-DEMUX unit based on the application information from-analyzed by said application information analysis unit.

27. (currently amended): ~~A-The transport layer relay device according to claim 22,~~
further comprising:

a network condition estimation unit ~~for estimating that~~, by means of measurement packets, estimates congestion conditions of ~~the a~~ network through which plurality of relay connections pass~~[[;]]~~.

wherein said transmission rate control unit ~~also uses the results inferred congestion~~ conditions estimated by said network condition estimation unit to determine said total transmission rate.

28. (currently amended): ~~A The transport layer relay device~~ according to claim 22, further comprising:

an inline measurement unit ~~for estimating that~~, by means of packets that are relayed, estimates congestion conditions of ~~the a~~ network through which the plurality of relay connections pass~~[[;]]~~.

wherein said transmission rate control unit ~~also uses the results inferred congestion~~ conditions estimated by said inline measurement unit to determine said total transmission rate.

29. (currently amended): ~~A The transport layer relay method~~ according to claim 1, wherein, when establishing a new transport layer connection between a new source terminal and a new destination terminal, said total transmission rate is determined, said total transmission rate is ~~divided for allotment as transmission rates allocated~~ to each relay connection, and the allotted

transmission rates are reported to the a partner transport layer relay device in establishing said new transport layer protocol connection.

30. (currently amended): ~~A-The transport layer relay device~~ according to claim 8, wherein, when establishing a transport layer connection between a new source terminal and a new destination terminal ~~with a terminal, an initial transmission rate information is reported to the destination terminal that is reported from said transmission rate control unit.~~

31. (currently amended): ~~A-The transport layer relay method~~ according to claim 15, wherein, when establishing new transport layer connection between a new source terminal and a new destination terminal, said total transmission rate is allocated and the allocated transmission rates determined and rates obtained by dividing said total transmission rate are reported to said a partner transport layer relay device in establishing a said new transport layer protocol connection.

32. (currently amended): ~~A-The transport layer relay device~~ according to claim 22, wherein, when establishing a transport layer connection between a new source terminal and a new destination terminal ~~with a terminal, an initial transmission rate information that is reported from said transmission rate control unit is reported to the new destination terminal.~~

33. (currently amended): A program embodied on a tangible computer-readable medium, which when executed by a computer, for causing causes a the computer to function as a transport layer relay device comprising:

a plurality of first terminal-side connection termination units unit for terminating that terminates a first transport layer connections-connection between a first source terminal and a first destination terminal with a plurality of terminals on respective transport layers in a first transport layer;

a second terminal-side connection termination unit that terminates a second transport layer connection between a second source terminal and a second destination terminal in a transport layer;

a plurality of first interdevice connection termination units unit for both-relaying transport layer data with each of said terminal-side connection termination units, terminating each of a plurality of transport layer connections between transport layer relay devices, and, when transmitting, transmitting in accordance with transmission rates that are reported from a transmission rate control unit that terminates a first transport layer connection with a first transport layer relay device that relays transport layer data between said first terminal-side connection termination unit and said first interdevice connection termination unit;

a second interdevice connection termination unit that terminates a second transport layer connection between a second transport layer device that relays transport layer data between said second terminal-side connection termination unit and said second interdevice connection termination unit; and

a transmission rate control unit that controls transmission rates of said first and second interdevice connection termination units for determining the total transmission rate of all interdevice connection termination units that are being used in relay, dividing said total transmission rate, and reporting rates that have been divided and allotted to each of said interdevice connection termination units that are being used in relay,

wherein the transmission rate control unit determines a total transmission rate of all interdevice connection termination units, allocates said total transmission rate among said first and second interdevice connection termination units, and reports a transmission rate that has been allocated to said first and second interdevice connection termination units, said first interdevice connection termination unit relaying said first transport layer connection to said first destination terminal as a first relay connection based on said allocated total transmission rate and said second interdevice connection termination unit relaying said second transport layer connection to said second destination terminal as a second relay connection based on said allocated total transmission rate, and

wherein the first source terminal, the second source terminal, the first destination terminal, and the second destination terminal are different from each other.

34. (currently amended): A program embodied on a tangible computer-readable medium, which when executed by a computer, for causing causes a the computer to function as a transport layer relay device comprising:

a plurality of terminal-side connection termination units ~~for terminating that terminate~~
transport layer connections ~~with between a plurality of source terminals and a plurality of~~
~~destination terminals~~ in the transport layer;

~~one an~~ interdevice connection termination unit ~~for terminating that terminates a plurality~~
~~of~~ transport layer connections ~~between with a plurality of~~ transport layer relay devices ~~that relay~~
~~transport layer data between said plurality of terminal-side connection termination units and said~~
~~interdevice connection termination unit, and, during transmission, transmitting in accordance~~
~~with a transmission rate that is reported from a transmission rate control unit;~~

a MUX-DEMUX unit ~~for grouping that groups, as one flow,~~ transport layer data from
each of said plurality of terminal-side connection termination units as a plurality of relay
connections and ~~transferring~~ transfers the plurality of relay connections to said interdevice
connection termination unit ~~in accordance with the distribution of rates that is reported from the~~
~~transmission rate control unit;~~ and

a transmission rate control unit that determines a total transmission rate of the plurality of
relay connections and allocates each transmission rate of the plurality of relay connections based
on the total transmission rate ~~for determining and reporting the total transmission rate of said~~
~~interdevice connection termination unit, and for reporting the distribution of rates obtained by~~
~~dividing said total transmission rate to the MUX-DEMUX unit,~~

wherein said interdevice connection termination unit transmits said plurality of relay
connections to said plurality of destination terminals in accordance with the total transmission
rate,

wherein said MUX-DEMUX unit groups data from the plurality of terminal-side connection termination units in accordance transmission rates allocated by the transmission rate control unit, and

wherein the transmission rate control unit determines the total transmission rate of said interdevice connection termination unit and reports the allocation of rates among the plurality of relay connections to said MUX-DEMUX unit.